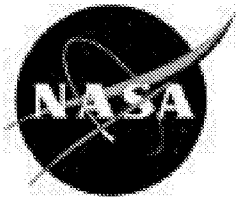
NASA/SP—2000–7501/SUPPL5



NASA THESAURUS SUPPLEMENT

A three-part cumulative update of the
1998 edition of the *NASA Thesaurus*

July 2000

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  7121 Standard Drive
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NASA/SP—2000–7501/SUPPL5

NASA THESAURUS SUPPLEMENT

A three-part cumulative update of the
1998 edition of the *NASA Thesaurus*

**National Aeronautics and
Space Administration**

July 2000

Available from:

NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076–1320

Table of Contents

Introduction

This Supplement is a cumulative update to the 1998 edition of the *NASA Thesaurus* (NASA/SP—1998–7501). The update includes all new terms and associated hierarchies added between the cut-off for the 1998 edition (December 1997) through June 30, 2000. Parts 1 and 2 of this *Supplement* correspond to Volumes 1 and 2 of the printed edition of the *NASA Thesaurus*. Supplements are normally published every six months.

Part 1 (*Hierarchical Listing*) contains the full hierarchical structure for each new term along with all new cross references and term definitions.

Display elements comprising the hierarchical listing are as follows:

Display Element	**Notation**
Generic Structure	GS
Related Term	RT
Use	USE
Use For	UF
Scope Note	SN
Definition	DEF
Array Terms	∞

For a fuller explanation, see the Introduction (pages viii–xi) in the printed version of the 1998 *NASA Thesaurus*, Volume 1.

Part 2 (*Rotated Term Display*) is a ready reference tool which provides additional 'access points' to the thesaurus terminology. It contains the postable terms and nonpostable cross references found in the Hierarchical Listing (Part 1) arranged in a KWIC (key-word-in-context) index.

Part 3 (*Changes*) is a listing of deletions or changes to postable terms or USE references made since the 1998 edition of the *NASA Thesaurus*. To control the size of the Supplement, only significant changes in term hierarchies and related term lists are presented.

NOTE: Other resources and products related to the NASA Thesaurus can be found at the following URL: **http://www.sti.nasa.gov/thesfrm1.htm**.

In addition to the above mentioned resources, a thesaurus listserv has been set up for submitting candidate terms and discussion of related lexicographical issues. A listing of candidate and accepted new terms is posted monthly. To subscribe to this listserv, send an e–mail message to **listserv@sti.nasa.gov**. Leave the subject line blank and in the message section, type **SUBSCRIBE THESAURUS–L <Your name>**. (Should you wish to cancel your subscription, send a message to the same address with UNSUBSCRIBE in the message section.)

Comments and suggestions regarding the NASA Thesaurus should be directed to:

Lexicographer
NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076–1320

E–mail: help@sti.nasa.gov
Fax: (301) 621–0134
Telephone: (301) 621–0114

NASA THESAURUS SUPPLEMENT

PART 1
HIERARCHICAL LISTING

A

ACE satellite
USE **Advanced Composition Explorer**

Advanced Composition Explorer
(added December 1999)
DEF Explorer spacecraft (launched August 25, 1997) carrying six high–resolution sensors and three monitoring instruments for sampling low–energy particles of solar origin and high–energy galactic particles. From a vantage point approximately 1/100 of the distance from the Earth to the Sun, the Advanced Composition Explorer (ACE) can perform measurements over a wide range of energy and nuclear mass, under all solar wind flow conditions and during both large and small particle events including solar flares. When reporting space weather ACE can provide an advance warning of geomagnetic storms.
UF *ACE satellite*
GS artificial satellites
. scientific satellites
. . Explorer satellites
. . . **Advanced Composition Explorer**
RT energetic particles
galactic cosmic rays
interplanetary medium
solar corpuscular radiation
solar cosmic rays
solar wind
space weather

aeroshells
(added May 1999)
DEF Aerodynamic structural shells that attach to, or comprise a portion of, the exterior of an aerospace vehicle or space probe; especially such structures that support atmospheric entry, aerobraking, aeroassist, or hypersonic flight.
GS aerodynamic configurations
. **aeroshells**
RT aeromaneuvering
nose cones
reentry vehicles
spacecraft design
spacecraft shielding
spacecraft structures

Alpha Magnetic Spectrometer
(added June 1998)
UF *AMS (spectrometer)*
GS measuring instruments
. spectrometers
. . **Alpha Magnetic Spectrometer**
RT antimatter
Cerenkov counters
cosmic rays
dark matter
International Space Station
interstellar matter
magnetic spectroscopy
space station payloads
spaceborne astronomy

AM–1 (EOS) spacecraft
USE **Terra spacecraft**

AMS (spectrometer)
USE **Alpha Magnetic Spectrometer**

anisoplanatism
(added May 1999)
DEF In adaptive optics (AO) systems, a performance–degrading effect that arises whenever light from the wave–front sensor beacon and light from the target object sample different volumes of optical turbulence. This effect results in an increased value of the aperture–averaged residual phase variance after AO compensation, which causes an exponential decrease in system performance.
RT aberration
adaptive optics
atmospheric correction
atmospheric optics
image resolution
optical correction procedure
phase error
telescopes

antenna gain
(added June 1998)
GS amplification
. **antenna gain**
RT antennas
automatic gain control
directional antennas
effectiveness
high gain
signal reception

antiphase boundaries
(added March 1998)
UF *antiphase domains*
APB (materials)
GS boundaries
. **antiphase boundaries**
RT binary alloys
crystal dislocations
crystal lattices
crystal structure
grain boundaries
interfacial energy
intermetallics
microstructure
order–disorder transformations
solid solutions
solid–solid interfaces
superlattices
ternary alloys

antiphase domains
USE **antiphase boundaries**

APB (materials)
USE **antiphase boundaries**

archaeomagnetism
USE **paleomagnetism**

associative memory
(added December 1999)
DEF A method or device for data storage in which data is identified by a part or properties of its content, rather than by an address or relative position.
UF *associative storage*
content–addressable memory
GS memory (computers)
. **associative memory**
RT associative processing (computers)
computer storage devices
neural nets
optical memory (data storage)

associative storage
USE **associative memory**

automatic indexing
USE **indexing (information science)**

bevel gears
(added May 1999)
GS gears
. **bevel gears**
. . spiral bevel gears
RT gear teeth

biomass burning
(added December 1999)
DEF Burning of vegetation in forests, grasslands, and agricultural lands usually carried out to clear the land and change its use; a significant contributor to the global budgets of many radiatively and chemically active gases and particulates in the atmosphere.
GS combustion
. **biomass burning**
RT air pollution
climate change
combustion products
contaminants
deforestation
environment pollution
forest fires
man environment interactions
smoke

Biot–Savart law
(added August 1998)
DEF Law describing the intensity of a magnetic field produced by a current carrying wire. Also applied in fluid dynamics to describe the flow–velocity field induced by a vortex.
GS laws
. **Biot–Savart law**
RT electromagnetism
flow velocity
magnetic fields
Maxwell equation
vortices

Boeing 717 aircraft
(added October 1998)
GS Boeing aircraft
. **Boeing 717 aircraft**
commercial aircraft
. **Boeing 717 aircraft**
jet aircraft
. turbofan aircraft
. . **Boeing 717 aircraft**
monoplanes
. **Boeing 717 aircraft**
passenger aircraft
. **Boeing 717 aircraft**
transport aircraft

. **Boeing 717 aircraft**
RT ∞ aircraft

bohrium
(added May 1998)
GS chemical elements
. **bohrium**
RT hassium
seaborgium

Bond number
(added December 1999)
DEF Dimensionless number representing the ratio between gravitational force and the surface tension of a bubble, drop, or meniscus.
GS dimensionless numbers
. **Bond number**
RT drops (liquids)
gravitational effects
interfacial tension
menisci

carrier sense multiple access
(added April 2000)
DEF A data transmission protocol for multi–access networks where each node in the network senses traffic and waits for it to clear before transmitting; if two or more nodes transmit simultaneously, they wait a random interval before attempting to re–transmit.
GS protocol (computers)
. **carrier sense multiple access**
telecommunication
. multiple access
. . **carrier sense multiple access**
transmission
. signal transmission
. . data transmission
. . . multiple access
. . . . **carrier sense multiple access**
RT communication networks
computer networks
Ethernet
local area networks
packet transmission

cascode devices
(added August 1998)
DEF Amplifier devices consisting of a common grounded–emitter (cathode) or source stage that drives a grounded–base output stage, resulting in high–impedance, high–gain, and low–noise,
GS amplifiers
. **cascode devices**
electronic equipment
. solid state devices
. . semiconductor devices
. . . **cascode devices**
RT CMOS
field effect transistors
high electron mobility transistors
switching circuits
transistor amplifiers
transistor circuits
transistors

cellular manufacturing
USE **group technology (manufacturing)**

chain reactions (chemistry)
(added May 1999)
GS chemical reactions
. **chain reactions (chemistry)**
RT chemical lasers
combustion chemistry

chain reactions (nuclear physics)
(added May 1999)
GS nuclear reactions
. nuclear fission
. . **chain reactions (nuclear physics)**
RT fission products
neutrons

Chandra X Ray Astrophysics Facility
USE **X Ray Astrophysics Facility**

clamped structures
(added February 1998)
RT beams (supports)
clamps
composite structures
joints (junctions)
laminates
plates (structural members)
shells (structural forms)
structural members
structural vibration
∞ structures

cloud–to–cloud discharges
(added August 1999)
GS electric current
. electric discharges
. . lightning
. . . **cloud–to–cloud discharges**

cloud–to–ground discharges
(added August 1999)
GS electric current
. electric discharges
. . lightning
. . . **cloud–to–ground discharges**
RT elves
sprites (atmospheric physics)

cochannel interference
(added April 2000)
DEF Interference caused by multiple, simultaneous transmissions occurring in the same communication channel.
GS electromagnetic interference
. radio frequency interference
. . **cochannel interference**
RT channel capacity
channel noise
intersymbolic interference
phase shift keying

Comet Nucleus Tour
(added February 1999)
DEF A NASA Discovery–class mission to acquire imagery and comparative spectral maps of comet nuclei and analyze comet dust flows. The mission spacecraft will fly to within 100 kilometers of at least three near–Earth comets including Comet Encke, Comet Schwassmann–Wachmann, and Comet d'Arrest.
UF *CONTOUR (mission)*
GS space missions
. flyby missions
. . **Comet Nucleus Tour**
RT comet nuclei
Encke comet
Schwassmann–Wachmann comet
swingby technique

content–addressable memory
USE **associative memory**

CONTOUR (mission)
USE **Comet Nucleus Tour**

Cooper–Harper ratings
(added August 1999)
GS flight characteristics
. pilot ratings
. . **Cooper–Harper ratings**
ratings
. pilot ratings
. . **Cooper–Harper ratings**
RT aircraft performance
helicopter performance

corrugated waveguides
(added February 1998)
GS waveguides
. **corrugated waveguides**
RT gratings (spectra)
optical waveguides
waveguide antennas

cosmions
USE **weakly interacting massive particles**

cost benefit analysis
USE **cost analysis**
cost effectiveness

critical current
(added December 1999)
DEF A current value in a superconductive material, at a particular constant temperature and in the absence of a magnetic field, below which the material is superconducting and above which the material behaves normally.
GS electric current
. **critical current**
RT critical temperature
current density
superconductivity
superconductors (materials)

cuprates
(added April 1999)
GS copper compounds
. **cuprates**
RT BSCCO superconductors
copper oxides
YBCO superconductors

cycloaddition
(added June 1998)
DEF Pericyclic chemical reaction in which unsaturated molecules combine to form a cyclic compound under the influence of heat or light.
GS chemical reactions
. **cycloaddition**
. . Diels–Alder reactions
RT cyclic compounds
photochemical reactions
polymerization
synthesis (chemistry)

Darkstar unmanned aerial vehicle
USE **pilotless aircraft**
reconnaissance aircraft

data mining
(added April 2000)
DEF The extraction of patterns from large data sets in order to discover previously unknown and potentially useful information.
UF *knowledge discovery*
knowledge extraction
GS data processing
. **data mining**
information analysis
. **data mining**
RT cluster analysis
data retrieval

machine learning
trend analysis

Deep Space 1 Mission
(added October 1998)
DEF First of several technology demonstration missions supporting the NASA New Millennium Program. Advanced technologies include an ion propulsion system, solar concentrator arrays, autonomous navigation and control systems, an integrated camera and imaging spectrometer, and several telecommunications and microelectronics devices. The mission plan includes a flyby of Asteroid 1992 KD.
UF *DS1 (space mission)*
GS space missions
. **Deep Space 1 Mission**
RT asteroid missions
autonomous navigation
flyby missions
interplanetary spacecraft
ion propulsion
NASA space programs
solar electric propulsion

deformable mirrors
(added May 1998)
GS mirrors
. **deformable mirrors**
RT adaptive optics
light modulation
phase modulation
segmented mirrors

Delta 3 launch vehicle
(added October 1998)
GS launch vehicles
. Delta launch vehicle
. . **Delta 3 launch vehicle**

Delta 4 launch vehicle
(added October 1998)
GS launch vehicles
. Delta launch vehicle
. . **Delta 4 launch vehicle**

dielectric loss
(added April 2000)
DEF The electric energy that is converted into heat in a dielectric material subjected to a changing electric field.
GS electrical properties
. dielectric properties
. . **dielectric loss**
losses
. **dielectric loss**
RT dielectrics
energy dissipation
permittivity

dielectric waveguides
(added February 1998)
GS waveguides
. **dielectric waveguides**
RT dielectrics
microwave transmission
optical waveguides
waveguide antennas
waveguide filters

differential games
(added October 1998)
GS games
. **differential games**
RT minimax technique
optimal control
pursuit–evasion games
stochastic processes
zero sum games

digital cameras
(added July 1998)
GS optical equipment
. cameras
. . **digital cameras**
photographic equipment
. cameras
. . **digital cameras**
RT CCD cameras
digital systems
digital techniques
photogrammetry
television cameras
video equipment

document indexing
USE **indexing (information science)**

DS1 (space mission)
USE **Deep Space 1 Mission**

dubnium
(added May 1998)
GS chemical elements
. **dubnium**
RT rutherfordium
seaborgium

EAM (physical chemistry)
USE **embedded atom method**

EAP (polymers)
USE **electroactive polymers**

e–commerce
USE **electronic commerce**

ekranoplanes
USE **wing–in–ground effect vehicles**

electroactive polymers
(added June 2000)
UF *EAP (polymers)*
RT actuators
conducting polymers
electromechanical devices
electrorheological fluids
electrostriction
microelectromechanical systems
∞ polymers
robot arms

electrochemical synthesis
(added January 2000)
DEF A chemical synthesis reaction that is induced by an electric current.
UF *electrosynthesis*
GS synthesis (chemistry)
. **electrochemical synthesis**
RT electrochemistry
electrolysis
polymerization

electronic commerce
(added April 2000)
DEF The buying and selling of goods and services via the Internet or other computer communications network.
UF *e–commerce*
GS commerce
. **electronic commerce**
RT computer information security
electronic mail
Internet resources
World Wide Web

electronic structure
(added April 1999)
SN (THE TERM "ATOMIC STRUCTURE" WAS USED FOR THIS CONCEPT PRIOR TO MAY 1999)
RT atomic structure
band structure of solids
electron energy
electron orbitals
electron states
energy bands
energy gaps (solid state)
energy levels
Fermi liquids

electrosynthesis
USE **electrochemical synthesis**

elves
(added January 2000)
DEF Transient air glow events observed near 90 km, nearly simultaneously with a strong cloud–to–ground lightning stroke. They often precede sprites, which may occur at lower altitudes a few milliseconds later. It is believed that elves are the result of wave heating by very low frequency (VLF) radio pulses emitted by the lightning discharge current.
GS atmospheric radiation
. sky radiation
. . **elves**
electromagnetic radiation
. light (visible radiation)
. . sky radiation
. . . **elves**
RT atmospheric electricity
atmospheric ionization
cloud–to–ground discharges
lightning
sprites (atmospheric physics)
thunderstorms

e–mail
USE **electronic mail**

embedded atom method
(added February 1998)
DEF A semiempirical calculation method developed by Daw and Baskes for determining the energetics of atoms in a bulk environment. The original form of the method was based on density functional theory and was intended primarily for tight–packed transition metals. More recent modifications have extended the applicability of the method to a large number of elements in the periodic table.
UF *EAM (physical chemistry)*
MEAM (physical chemistry)
modified embedded atom method
RT alloys
crystal defects
grain boundaries
interatomic forces
metals
∞ methodology
molecular dynamics
potential energy

enantiomeric compounds
USE **enantiomers**

enantiomers
(added August 1998)
DEF Isomeric pairs whose crystalline forms or molecular structures are non–superimposable mirror images.
UF *enantiomeric compounds*
enantiomorphs
GS isomers

. **enantiomers**
RT chirality
crystal structure
isomorphism
molecular structure
stereochemistry
symmetry

enantiomorphs
USE **enantiomers**

environmental cleanup
(added February 1999)
GS cleaning
. **environmental cleanup**
RT decontamination
environment management
environment protection
hazardous wastes
oil pollution
oil slicks
pollution control
reclamation
soil pollution
waste disposal
waste treatment
water pollution
water treatment

EOS AM–1 spacecraft
USE **Terra spacecraft**

Ethernet
(added January 2000)
DEF Computer network protocol originally developed in the 1970s for local area network technology; uses carrier sense multiple access with collision detection (CSMA/CD), coaxial cable, and broadcast transmission.
GS protocol (computers)
. **Ethernet**
RT carrier sense multiple access
computer networks
local area networks

Euler–Bernoulli beam theory
USE **Euler–Bernoulli beams**

Euler–Bernoulli beams
(added April 1998)
UF *Euler–Bernoulli beam theory*
GS structural members
. beams (supports)
. . **Euler–Bernoulli beams**
RT axial strain
bending
bending vibration
dynamic structural analysis
elastic properties
mathematical models
partial differential equations
structural analysis
Timoshenko beams

evanescent waves
(added March 1998)
GS surface waves
. **evanescent waves**
RT acoustic impedance
evanescence
fiber optics
internal waves
plane waves
propagation modes
reflected waves
wave propagation
∞ waves

FDTD (mathematics)
USE **finite difference time domain method**

ferroelastic materials
(added June 1998)
GS **ferroelastic materials**
. shape memory alloys
. . nitinol alloys
RT ceramics
ferroelasticity
ferroelectric materials
∞ materials
smart materials

ferroelasticity
(added June 1998)
GS mechanical properties
. elastic properties
. . **ferroelasticity**
RT crystal structure
domain wall
ferroelastic materials
ferroelectricity
phase transformations
shape memory alloys
smart materials

fiber pushout
(added September 1999)
GS releasing
. **fiber pushout**
RT ceramic matrix composites
composite materials
debonding (materials)
destructive tests
failure modes
fiber composites
fiber pullout
fiber–matrix interfaces
fibers
interfacial energy
∞ materials tests
metal matrix composites
reinforcing fibers

field tests
(added November 1998)
SN (EXCLUDES TESTS OF ELECTRIC, MAGNETIC, OR ELECTROMAGNETIC FIELDS)
DEF Tests carried out in the actual setting in which the subject device is intended to operate.
RT environmental tests
performance tests
∞ tests

field–programmable gate arrays
(added April 2000)
GS circuits
. gates (circuits)
. . **field–programmable gate arrays**
. integrated circuits
. . **field–programmable gate arrays**
programmable logic devices
. **field–programmable gate arrays**

finite difference time domain method
(added April 1999)
UF *FDTD (mathematics)*
GS analysis (mathematics)
. numerical analysis
. . approximation
. . . finite difference theory
. . . . **finite difference time domain method**
. time domain analysis
. . **finite difference time domain method**
RT computational electromagnetics
electromagnetic scattering

flow noise
(added March 2000)
DEF Noise produced by the flow of fluids around or through a body; the pressure variations associated with a turbulent flow field.
GS elastic waves
. sound waves
. . noise (sound)
. . . **flow noise**
. . . . aerodynamic noise
. . . . . blade slap noise
. . . . . propeller noise
. . . . . screech tones
RT aeroacoustics
ducted flow
nozzle flow
pipe flow
underwater acoustics

free–space optical communication
(added June 1998)
GS telecommunication
. communication
. . optical communication
. . . **free–space optical communication**
RT high power lasers
laser beams
satellite communication
space communication

free–space optical interconnects
(added June 1998)
UF *FSOI (integrated optics)*
GS optical interconnects
. **free–space optical interconnects**
RT integrated optics
interprocessor communication
optical computers
optical switching
optoelectronic devices
photonics

frequency domain analysis
(added April 1999)
GS analysis (mathematics)
. **frequency domain analysis**
RT control systems design
dynamic response
frequency response
parameter identification
signal processing

FSOI (integrated optics)
USE **free–space optical interconnects**

fullerides
(added February 1998)
GS carbon compounds
. **fullerides**
RT ∞ alkali metal compounds
∞ chemical compounds
doped crystals
fullerenes
superconductors (materials)

fuselage–wing stores
USE **wing–fuselage stores**

fusion propulsion
(added September 1999)
GS propulsion
. nuclear propulsion
. . **fusion propulsion**
RT inertial confinement fusion
nuclear electric propulsion
nuclear fusion

nuclear rocket engines
plasma propulsion
spacecraft propulsion

Gabor filters
(added February 1998)
GS image filters
. **Gabor filters**
RT computer vision
∞ filters
Gabor transformation
image analysis
image processing
low pass filters
neural nets
spatial filtering
textures

Gabor transformation
(added February 1998)
GS transformations (mathematics)
. **Gabor transformation**
RT Fourier transformation
Gabor filters
holography
image processing
signal analysis
wavelet analysis

games
(added October 1998)
GS **games**
. differential games
. pursuit–evasion games
. war games
. zero sum games
RT control theory
game theory
optimization

Genesis mission
(added February 1999)
DEF A space mission to collect solar wind samples from a halo orbit about the sun–Earth L1 point for two years, returning those samples to Earth in 2003 for analysis and examination. Analysis of the samples collected by the mission will contribute to an understanding of the origins of the solar system.
GS space missions
. **Genesis mission**
RT solar system evolution
solar wind

glucocorticoids
(added December 1999)
DEF Adrenocortical steroid hormones that are involved in the metabolism of fats, proteins, and carbohydrates, and have anti–inflammatory properties.
GS organic compounds
. lipids
. . steroids
. . . corticosteroids
. . . . **glucocorticoids**
secretions
. endocrine secretions
. . hormones
. . . corticosteroids
. . . . **glucocorticoids**
RT adrenal gland
atrophy
carbohydrate metabolism
hormone metabolisms
hypokinesia
lipid metabolism
muscles
protein metabolism

Godunov method
(added February 1998)
DEF Non–oscillatory finite–volume scheme that incorporates the exact or approximate solution to the Riemann initial–value problem, or a generalization of it.
GS analysis (mathematics)
. numerical analysis
. . finite volume method
. . . **Godunov method**
procedures
. finite volume method
. . **Godunov method**
RT approximation
Cauchy problem
Cauchy–Riemann equations
computational fluid dynamics
Euler equations of motion
finite difference theory
shock wave interaction
supersonic flow

GOES 10
(added March 2000)
GS artificial satellites
. meteorological satellites
. . GOES satellites
. . . **GOES 10**
. synchronous satellites
. . GOES satellites
. . . **GOES 10**

greedy algorithms
(added March 2000)
DEF Any algorithm characterized by a procedure that selects the most extreme element from a set to satisfy a given goal. A recursive procedure for constructing a set of objects from the smallest possible elements.
GS mathematical logic
. algorithms
. . **greedy algorithms**
RT graph theory
heuristic methods
minimax technique
optimization

group technology (manufacturing)
(added April 2000)
DEF A manufacturing methodology where production processes are organized into groups or cells based on similarities in the manufacturing requirements of product parts or production equipment capabilities.
UF *cellular manufacturing*
GS manufacturing
. **group technology (manufacturing)**
production engineering
. **group technology (manufacturing)**
RT computer aided manufacturing
industrial management
operations research
process control (industry)
production management

H–2 control
(added February 1998)
GS automatic control
. optimal control
. . **H–2 control**
optimization
. optimal control
. . **H–2 control**
RT control systems design
control theory
controllers
feedback control
H–infinity control
linear quadratic Gaussian control

Hale–Bopp comet
(added July 1998)
DEF Long–period comet discovered July 23, 1995; designated C/1995 O1.
GS celestial bodies
. comets
. . **Hale–Bopp comet**
RT Oort cloud

Hall thrusters
(added June 2000)
GS engines
. rocket engines
. . electric rocket engines
. . . electrostatic engines
. . . . **Hall thrusters**
RT electric propulsion
Hall accelerators
ion engines
plasma engines
spacecraft propulsion

halon
(added January 2000)
DEF A bromofluorocarbon compound that was widely used as an agent for fire suppression and explosion protection. After being recognized as an ozone–depleting substance, the U.S. production and import of halons was banned in 1994.
GS carbon compounds
. halocarbons
. . **halon**
halogen compounds
. bromine compounds
. . **halon**
. halocarbons
. . **halon**
RT fire extinguishers
flame retardants
fluorocarbons

hardware–in–the–loop simulation
(added February 1999)
UF *hardware–in–the–loop tests*
GS simulation
. **hardware–in–the–loop simulation**
RT computerized simulation
control simulation
performance tests
systems simulation

hardware–in–the–loop tests
USE **hardware–in–the–loop simulation**

hassium
(added May 1998)
GS chemical elements
. **hassium**
RT bohrium
meitnerium

head up tilt
(added March 1998)
DEF Body posture while lying on a tilt table with the head higher than the rest of the body.
UF *HUT (physiology)*
GS posture
. **head up tilt**
RT aerospace medicine
bed rest
bioastronautics
cardiovascular system
gravitational physiology
head down tilt

hemodynamic responses
lower body negative pressure
orthostatic tolerance
physiological responses
supine position
weightlessness simulation

heavy fermion superconductors
(added April 1999)
GS conductors
. superconductors (materials)
. . **heavy fermion superconductors**
intermetallics
. heavy fermion systems
. . **heavy fermion superconductors**

heavy fermion systems
(added April 1999)
GS intermetallics
. **heavy fermion systems**
. . heavy fermion superconductors
RT fermions
superconductors (materials)

heavy metals
(added July 1999)
DEF Metals or alloys having a high specific gravity; usually ones with a density greater than 5 grams per cubic centimeter.
GS metals
. **heavy metals**
RT cadmium
chromium
contaminants
copper
industrial wastes
lead (metal)
mercury (metal)
soil pollution
toxic hazards
zinc

hindcasting
(added July 1999)
DEF The process of reconstructing the time and space evolution of an atmospheric or oceanic phenomenon that has occurred in the past, through an analysis of historical data, a mathematical–model simulation of the processes involved, or a combination of data analysis and modeling.
GS predictions
. **hindcasting**
RT forecasting
meteorological parameters
nowcasting
oceanographic parameters
weather forecasting

HUT (physiology)
USE **head up tilt**

hybrid–Trefftz finite element method
USE **finite element method**
Trefftz method

hydrophobicity
(added June 2000)
DEF The degree to which a substance is insoluble in water, or resists wetting or hydration.
GS hygral properties
. **hydrophobicity**
RT adsorption
chemical properties
hydration
hygroscopicity
moisture resistance
∞ properties
solubility
sorption
surface properties
surfactants
waterproofing
wettability
wetting

hypothetical particles
(added November 1999)
GS particles
. elementary particles
. . **hypothetical particles**
. . . gluons
. . . gravitinos
. . . gravitons
. . . partons
. . . quarks
. . . tachyons
. . . weakly interacting massive particles

hypothetical planets
(added June 1998)
UF *Phaethon (hypothetical planet)*
planet X
transplutonic planets
GS celestial bodies
. planets
. . **hypothetical planets**
RT comets
extrasolar planets
planetary orbits

in vitro methods and tests
(added May 1999)
DEF Tests of, or methods related to, biological or biochemical processes occurring in an artificial environment or outside of a living cell or organism.
RT bioassay
biotechnology
conditions
culture techniques
cytology
fertilization
histology
in vivo methods and tests
∞ methodology
∞ tests

in vivo methods and tests
(added May 1999)
DEF Tests of, or methods related to, biological or biochemical processes occurring within a living cell or organism.
RT bioassay
biotechnology
conditions
culture techniques
cytology
histology
in vitro methods and tests
intravenous procedures
∞ methodology
∞ tests

indexing (information science)
(added April 2000)
DEF The representation of document content in a systematic, organized form to support information location, retrieval, or analysis.
UF *automatic indexing*
document indexing
machine aided indexing
GS information analysis
. **indexing (information science)**
RT indexes (documentation)
information management
information retrieval
terminology
terms
thesauri

inflight simulation
USE **in–flight simulation**

in–flight simulation
(added October 1998)
DEF The use of a specialized test aircraft to simulate the flight characteristics of another vehicle. The test aircraft is typically capable of duplicating the computed responses of the simulated vehicle through special aerodynamic and control system features.
UF *inflight simulation*
GS simulation
. flight simulation
. . **in–flight simulation**
RT aircraft control
flight characteristics
flight control
flight simulators
flight tests
training simulators

information analysis
(added April 2000)
GS **information analysis**
. data mining
. indexing (information science)
. scientific visualization
. . numerical flow visualization
. trend analysis
RT information resources management
information retrieval
natural language processing

Integrated Truss Structure Z1
(added June 2000)
DEF An early exterior framework for the International Space Station to allow the first U.S. solar arrays to be temporarily installed on the Unity module for early power.
GS space station structures
. **Integrated Truss Structure Z1**
RT International Space Station
trusses
Unity connecting module

intelligent materials
USE **smart materials**

intercalibration
(added January 1999)
DEF Calibration between two or more data sources, including (1) the comparison of data sets acquired by different types of measurement systems for the purpose of deducing the calibration values for one of the measurement systems; (2) the mutual calibration of data from different measurement systems through the comparison of the data with model calculations; and (3) the calibration of multiple detectors on a single instrument through the comparison of data from each detector.
GS calibrating
. **intercalibration**
RT comparison
correction
multisensor applications
standardization

intracloud discharges
(added August 1999)
GS electric current
. electric discharges

. . lightning
. . . **intracloud discharges**

ion optics
(added June 1998)
RT beam waveguides
beamforming
electron optics
ion beams
ion engines
ion propulsion
mass spectrometers
∞ optics

Iridium network
(added December 1998)
DEF A 66–satellite wireless personal telecommunications network designed to provide worldwide telephone, paging, facsimile and data services to handheld or mobile equipment.
UF *Iridium satellites*
GS networks
. communication networks
. . **Iridium network**
. satellite networks
. . satellite constellations
. . . **Iridium network**
RT communication satellites
facsimile communication
mobile communication systems
satellite communication
telephony
wireless communication

Iridium satellites
USE **communication satellites**
Iridium network

ISS (space station)
USE **International Space Station**

Java (programming language)
(added December 1998)
GS languages
. programming languages
. . high level languages
. . . **Java (programming language)**
RT C++ (programming language)
client server systems
internets
object–oriented programming
World Wide Web

Josephson effect
(added April 1999)
UF *Josephson tunneling*
RT electron tunneling
Josephson junctions
SIS (superconductors)
superconducting devices
superconductors (materials)

Josephson tunneling
USE **Josephson effect**

kink bands
(added March 1998)
RT buckling
compression loads
edge dislocations
failure modes
fiber composites
microstructure
plastic deformation
reinforcing fibers
single crystals

kinking
(added April 1998)
RT bending
buckling
compression loads
cracking (fracturing)
deformation
displacement
failure modes
fiber composites
folding
heaving
twisting
wrinkling

knowledge discovery
USE **data mining**

knowledge extraction
USE **data mining**

Laves phases
(added August 1998)
GS solid phases
. **Laves phases**
RT alloys
crystal lattices
crystal structure
cubic lattices
interstitials
microstructure
phase transformations

leaders (meteorology)
(added August 1999)
GS electric current
. electric discharges
. . lightning
. . . **leaders (meteorology)**
. . . . stepped leaders

lithium batteries
(added December 1999)
GS electrochemical cells
. electric batteries
. . **lithium batteries**
. . . lithium sulfur batteries
RT storage batteries

Long March launch vehicles
(added January 1999)
GS launch vehicles
. **Long March launch vehicles**
RT Chinese space program
Chinese spacecraft
heavy lift launch vehicles

Lunar Prospector
(added February 1998)
GS artificial satellites
. lunar satellites
. . **Lunar Prospector**
lunar spacecraft
. lunar satellites
. . **Lunar Prospector**
RT lunar composition
lunar exploration
lunar programs
lunar resources
lunar surface

machine aided indexing
USE **indexing (information science)**

MACHOs (astronomy)
USE **massive compact halo objects**

magnetars
(added January 2000)
DEF Highly magnetized neutron stars believed to emit quasi–steady x–rays along with bursts of soft gamma rays— emissions powered by their magnetic energy. According to the magnetar theory, these stars form in some fraction of all supernovae. When they are young (with ages less than about 10,000 years) magnetars may be observed as soft gamma repeaters (SGRs) or anomalous X–ray pulsars.
GS celestial bodies
. stars
. . magnetic stars
. . . **magnetars**
. . neutron stars
. . . **magnetars**
RT pulsars
soft gamma repeaters
supernova remnants
x ray sources

magnetic nozzles
(added September 1999)
DEF Nozzle devices used in some nuclear and plasma propulsion systems that utilize magnetic fields to direct and accelerate plasma flows, thereby providing thrust for propulsion.
RT coaxial plasma accelerators
electric rocket engines
∞ nozzles
nuclear propulsion
nuclear rocket engines
plasma acceleration
plasma engines
plasma propulsion
rocket nozzles
spacecraft propulsion

magnetostratigraphy
(added April 1999)
GS stratigraphy
. **magnetostratigraphy**
RT geochronology
paleomagnetism

markup languages
USE **document markup languages**

Mars Climate Orbiter
(added March 1999)
DEF One of two spacecraft comprising the Mars Surveyor 98 program; launched December 1998. After obtaining a polar, nearly circular orbit around Mars, the Orbiter will serve as a radio relay during the Lander surface mission, then begin monitoring the atmosphere, surface, and polar caps for a complete Martian year. The Orbiter carries two science instruments: the Pressure Modulated Infrared Radiometer and the Mars Color Imager.
UF *Mars Surveyor 98 Orbiter*
GS interplanetary spacecraft
. Mars probes
. . **Mars Climate Orbiter**
unmanned spacecraft
. space probes
. . Mars probes
. . . **Mars Climate Orbiter**
RT Mars atmosphere
Mars missions
Mars Polar Lander
Mars surface
Mars Surveyor 98 Program

Mars Global Surveyor
(added March 1999)
DEF Spacecraft and related mission designed to orbit Mars over a two year period and collect data on the surface morphology, topography, composition, gravity, atmospheric dynamics, and magnetic field. Launched November 1996.
UF *MGS (spacecraft)*
GS interplanetary spacecraft
. Mars probes
. . **Mars Global Surveyor**
unmanned spacecraft
. space probes
. . Mars probes
. . . **Mars Global Surveyor**
RT Mars atmosphere
Mars missions
Mars Observer
Mars surface

Mars missions
(added February 1999)
GS space missions
. **Mars missions**
. . manned Mars missions
. . Mars sample return missions
. . Mars Surveyor 2001 Mission
RT Earth–Mars trajectories
Mars Climate Orbiter
Mars exploration
Mars Global Surveyor
Mars landing
Mars Observer
Mars Pathfinder
Mars Polar Lander
Mars probes
Mars surface samples
Mars Surveyor 98 Program
∞ missions
return to Earth space flight

Mars Polar Lander
(added March 1999)
DEF One of two spacecraft comprising the Mars Surveyor 98 program; launched January 1999. After a soft landing near the Martian south pole, the Lander will search for near–surface ice and possible surface records of cyclic climate change, and characterize physical processes key to the seasonal cycles of water, carbon dioxide and dust on Mars. Prior to landing, the Deep Space 2 microprobes will be released as part of a technology–validation mission related to multiple–lander spacecraft.
UF *Mars Surveyor 98 Lander*
GS interplanetary spacecraft
. Mars probes
. . **Mars Polar Lander**
unmanned spacecraft
. space probes
. . Mars probes
. . . **Mars Polar Lander**
RT Mars atmosphere
Mars Climate Orbiter
Mars missions
Mars surface
Mars Surveyor 98 Program

Mars Surveyor 98 Lander
USE **Mars Polar Lander**

Mars Surveyor 98 Orbiter
USE **Mars Climate Orbiter**

Mars Surveyor 98 Program
(added March 1999)
DEF Mars exploration program consisting of two mission spacecraft— the Mars Climate Orbiter and the Mars Polar Lander. Two surface penetrating microprobes (part of the associated Deep Space 2 mission) for detecting water ice are also piggybacking on the Lander.
GS programs
. NASA programs
. . NASA space programs
. . . **Mars Surveyor 98 Program**
. space programs
. . NASA space programs
. . . **Mars Surveyor 98 Program**
RT Mars atmosphere
Mars Climate Orbiter
Mars missions
Mars Polar Lander
Mars surface

Mars Surveyor 2001 Mission
(added July 1999)
GS space missions
. Mars missions
. . **Mars Surveyor 2001 Mission**
RT Mars environment
Mars surface
Mars surface samples
NASA space programs

Martian meteorites
USE **SNC meteorites**

massive compact halo objects
(added November 1999)
DEF Objects, such as brown dwarfs, black holes, and massive planets, hypothesized to account for the dark matter in the halo of the Milky Way. The signature of these objects is the occasional amplification of the light from extragalactic stars by the gravitational lens effect.
UF *MACHOs (astronomy)*
GS celestial bodies
. **massive compact halo objects**
RT brown dwarf stars
dark matter
galactic halos
gravitational lenses
Milky Way Galaxy
missing mass (astrophysics)
red dwarf stars

MEAM (physical chemistry)
USE **embedded atom method**

meitnerium
(added May 1998)
GS chemical elements
. **meitnerium**
RT hassium

MEMS (electromechanical devices)
USE **microelectromechanical systems**

MGS (spacecraft)
USE **Mars Global Surveyor**

microelectromechanical systems
(added October 1998)
UF *MEMS (electromechanical devices)*
GS electromechanical devices
. **microelectromechanical systems**
RT electroactive polymers
microinstrumentation
microminiaturization
microminiaturized electronic devices
microsatellites
nanosatellites
nanotechnology

microsatellites
(added October 1998)
DEF Satellites with a total mass between 10 and 100 kg often incorporating miniaturized electronic and mechanical systems.
UF *microsats*
GS artificial satellites
. **microsatellites**
RT microelectromechanical systems
microminiaturization
microminiaturized electronic devices
nanosatellites
satellite constellations
satellite design
small satellite technology
small scientific satellites

microsats
USE **microsatellites**

Mindlin plate theory
USE **Mindlin plates**

Mindlin plates
(added April 1998)
UF *Mindlin plate theory*
Reissner–Mindlin plates
GS structural members
. plates (structural members)
. . **Mindlin plates**
RT dynamic structural analysis
finite element method
free vibration
plate theory
Reissner theory
shear strain
structural analysis
structural vibration
thick plates

mischmetal
(added June 1998)
DEF An alloy consisting of a natural mixture of rare–earth metals; used in electrode materials and hydrogen–storage alloys, as a general alloy addition, and in the production of some aluminum alloys and steels.
GS alloys
. rare earth alloys
. . **mischmetal**
RT alloying
aluminum alloys
cathodic coatings
cerium
desorption
electrode materials
intermetallics
steels

modified embedded atom method
USE **embedded atom method**

mutagenesis
(added June 2000)
DEF Induction or development of a genetic mutation via a natural environmental mutagen or through the methods of genetic engineering.
RT deoxyribonucleic acid
gene expression
genes
mutagens
mutations
radiation effects

nacelle wing configurations
USE **wing nacelle configurations**

nanosatellites
(added October 1998)
DEF Satellites with a total mass smaller than 10 kg incorporating miniaturized electronic and mechanical systems.
UF *nanosats*
GS artificial satellites
. **nanosatellites**
RT microelectromechanical systems
microminiaturization
microminiaturized electronic devices
microsatellites
satellite constellations
satellite design
small satellite technology
small scientific satellites

nanosats
USE **nanosatellites**

nanotechnology
(added June 2000)
DEF The creation of functional materials, devices, and systems through control of matter on the nanometer–length scale; exploitation of novel phenomena and properties at the nanometer scale.
GS technologies
. **nanotechnology**
RT microelectromechanical systems
microelectronics
nanostructure (characteristics)
nanostructures (devices)
nanotubes
quantum dots
quantum electronics
quantum wires

nanotubes
(added June 2000)
DEF Nanostructures having a closed, tubular morphology that can be single–walled or multi–walled. The structures are believed to be defect free, leading to high strength despite their low density; and can be either electrically conductive or semiconductive, depending on their helicity.
UF *nanotubules*
GS microstructure
. nanostructure (characteristics)
. . **nanotubes**
RT fullerenes
graphite
nanostructures (devices)
nanotechnology
∞ tubes

nanotubules
USE **nanotubes**

Next Generation Space Telescope project
(added December 1999)
DEF Project in the NASA Origins program with the goal of developing a spaceborne observatory to succeed the Hubble Space Telescope after 2005. The telescope is foreseen to have an aperture of 8 meters and be optimized for near infrared wavelengths (0.6–10+ microns) in order to enable the exploration of the most remote high redshift universe.
UF *NGST project*
GS programs
. projects
. . **Next Generation Space Telescope project**
RT astronomical observatories
infrared telescopes
NASA space programs
spaceborne telescopes

NGST project
USE **Next Generation Space Telescope project**

Nozomi Mars Orbiter
(added August 1998)
DEF A Japanese Mars mission spacecraft designed to study the Martian upper atmosphere and its interaction with the solar wind, and to develop technologies for use in future planetary missions. Specifically, instruments on the spacecraft enable the measurement of the structure, composition and dynamics of the ionosphere; aeronomy effects of the solar wind; the escape of atmospheric constituents; the intrinsic magnetic field; and dust in the upper atmosphere and in–orbit around Mars.
UF *Planet–B spacecraft*
GS interplanetary spacecraft
. Mars probes
. . **Nozomi Mars Orbiter**
Japanese spacecraft
. **Nozomi Mars Orbiter**
unmanned spacecraft
. space probes
. . Mars probes
. . . **Nozomi Mars Orbiter**
RT aeronomy
Deimos
Phobos
planetary atmospheres
solar planetary interactions

optical interconnects
(added June 1998)
GS **optical interconnects**
. free–space optical interconnects
RT connectors
electric connectors
integrated optics
optical computers
optical switching
optoelectronic devices
photonics

orbit determination
(added December 1998)
GS **orbit determination**
. airborne range and orbit determination
. orbit calculation
. . minimum variance orbit determination
. . orbital position estimation
RT Global Positioning System
position errors
satellite tracking
space navigation
spacecraft control
spacecraft position indicators

PDS (spectroscopy)
USE **photothermal deflection spectroscopy**

perfectly matched layers
(added July 1998)
DEF In the area of computational electromagnetism, an absorbing boundary condition used for terminating infinite domain calculations in the finite–difference time–domain (FDTD) or finite element methods. The approach has also been extended to the analysis of some problems in acoustics.
UF *PML (electromagnetism)*
GS conditions
. boundary conditions
. . **perfectly matched layers**
RT computational electromagnetics
computational grids
electromagnetic absorption
electromagnetic scattering
finite difference theory
finite element method
Maxwell equation

Phaethon (hypothetical planet)
USE **hypothetical planets**

Phobos spacecraft
(added August 1998)
DEF Two Soviet spacecraft (Phobos 1 and 2, both launched in July 1988) designed to study the plasma environment in the Martian vicinity, the surface and atmosphere of Mars, and the surface composition of the Martian satellite Phobos. Other mission objectives included the study of the interplanetary environment and solar observations.
GS interplanetary spacecraft
. Mars probes
. . **Phobos spacecraft**
Soviet spacecraft
. **Phobos spacecraft**
unmanned spacecraft
. space probes
. . Mars probes
. . . **Phobos spacecraft**
RT Mars atmosphere
Mars environment
Phobos

photoresists
(added June 2000)
DEF Photosensitive substances that are either rendered soluble or insoluble to chemical etchants when exposed to light, and are used in transferring circuit patterns in the production of integrated circuits.
RT etching
integrated circuits
microelectronics
photolithography
photomasks
photopolymers
photosensitivity

photothermal deflection spectroscopy
(added November 1998)
UF *PDS (spectroscopy)*
GS spectroscopy
. **photothermal deflection spectroscopy**
RT optical measurement
photoacoustic spectroscopy
thermal diffusivity
thermal lensing

pilot opinion ratings
USE **pilot ratings**

pilot ratings
(added August 1999)
DEF Subjective assessment of the handling and stability characteristics of an aircraft or other flight vehicle.
UF *pilot opinion ratings*
GS flight characteristics
. **pilot ratings**
. . Cooper–Harper ratings

ratings
. **pilot ratings**
. . Cooper–Harper ratings
RT aircraft performance
assessments
controllability
helicopter performance

planet X
USE **hypothetical planets**

Planet–B spacecraft
USE **Nozomi Mars Orbiter**

PML (electromagnetism)
USE **perfectly matched layers**

Population III stars
(added July 1999)
UF *primordial stars*
GS celestial bodies
. stars
. . **Population III stars**
RT cosmology
dark matter
relic radiation
stellar evolution
supermassive stars

preventive maintenance
(added June 2000)
GS maintenance
. **preventive maintenance**
prevention
. **preventive maintenance**
RT aircraft maintenance
failure analysis
inspection
nondestructive tests
reliability analysis

primordial stars
USE **Population III stars**

proportional navigation
(added July 1998)
GS navigation
. **proportional navigation**
RT homing
interception
line of sight
missile control
proportional control
rendezvous guidance
terminal guidance

proton–antiproton interactions
(added June 1999)
GS particle interactions
. elementary particle interactions
. . **proton–antiproton interactions**
RT annihilation reactions
antiprotons
high energy interactions
matter–antimatter propulsion

pursuit–evasion games
(added October 1998)
GS games
. **pursuit–evasion games**
RT differential games
evasive actions
interception
optimal control
pursuit tracking
trajectory optimization
zero sum games

quantum communication
(added March 2000)
DEF Any form of communication that depends on coherent quantum–mechanical effects (quantum interference or quantum entanglement) to transmit, protect or authenticate information, or to perform distributed computational tasks.
GS telecommunication
. communication
. . **quantum communication**
RT communication theory
optical communication
quantum computation

quantum computation
(added March 2000)
DEF Any form of information processing that depends on coherent quantum–mechanical effects (quantum interference or quantum entanglement) to perform computational tasks.
UF *quantum computing*
GS computation
. **quantum computation**
RT quantum communication
quantum computers
quantum cryptography
quantum mechanics
Turing machines

quantum computers
(added March 2000)
DEF Devices capable of performing quantum computations. There are many proposals for the physical basis of quantum computers. The 0 and 1 of a quantum bit (i.e., qubit) could be the ground and excited states of an atom in a linear ion trap; the polarizations of photons interacting in an optical cavity; or the excess of one nuclear spin state over another in a liquid sample in an NMR machine.
GS data processing equipment
. computers
. . **quantum computers**
RT quantum computation

quantum computing
USE **quantum computation**

quantum cryptography
(added March 2000)
DEF Any form of cryptography that depends for its security on coherent quantum–mechanical effects (quantum interference or quantum entanglement).
GS cryptography
. **quantum cryptography**
RT computer information security
quantum computation

Rayleigh fading
(added June 2000)
DEF Rapid–fluctuation, small–scale fading resulting from multipath effects, and typically occurring in non–line–of–sight (NLOS) environments.
GS fading
. signal fading
. . **Rayleigh fading**
RT channels (data transmission)
mobile communication systems
multipath transmission
phase shift keying
radio signals
reception diversity

RBCC engines
USE **rocket–based combined–cycle engines**

red sprites
USE **sprites (atmospheric physics)**

Reissner–Mindlin plates
USE **Mindlin plates**

renewable energy
(added December 1998)
GS **renewable energy**
. geothermal energy utilization
. hydroelectricity
. tidepower
. waterwave energy
. windpower utilization
RT bioconversion
biomass energy production
clean energy
energy policy
∞ energy sources
energy technology
geothermal energy conversion
hydrogen–based energy
ocean thermal energy conversion
solar energy conversion
waste utilization
waterwave energy conversion

Ringleb flow
(added July 1998)
GS fluid flow
. compressible flow
. . **Ringleb flow**
. steady flow
. . **Ringleb flow**
. two dimensional flow
. . **Ringleb flow**
RT critical flow
subsonic flow
transonic flow

rocket–based combined–cycle engines
(added August 1999)
DEF Launch vehicle engines that integrate a high specific impulse, low thrust–to–weight, airbreathing engine with a low–impulse, high thrust–to–weight rocket. The engines are often defined by four modes of operation in a single–stage–to–orbit configuration. In the first mode, the engine functions as a rocket–driven ejector. When the rocket engine is switched off, subsonic combustion (mode 2) is present in the ramjet mode. As the vehicle continues to accelerate, supersonic combustion (mode 3) occurs in the ramjet mode. Finally, as the edge of the atmosphere is approached and the engine inlet is closed off, the rocket is reignited and the final accent to orbit is undertaken in an all–rocket mode (mode 4).
UF *RBCC engines*
GS engines
. rocket engines
. . **rocket–based combined–cycle engines**
RT air breathing boosters
air breathing engines
hybrid propulsion
integral rocket ramjets
ramjet engines
single stage to orbit vehicles
spacecraft propulsion
supersonic combustion ramjet engines

Rossi X Ray Timing Explorer
USE **X Ray Timing Explorer**

RXTE (satellite)
USE **X Ray Timing Explorer**

scarf joints
(added March 1998)
DEF A joint in which the overlapping parts are tapered to form a continuous length, with no increase in dimension at the joint.
GS joints (junctions)
. **scarf joints**
RT bolted joints
bonded joints
lap joints
metal joints
scarfing

scene generation
(added July 1998)
GS imaging techniques
. **scene generation**
simulation
. **scene generation**
RT computer graphics
flight simulation
image reconstruction
scientific visualization
target simulators

screech tones
(added March 1998)
DEF Discrete acoustic tones produced by imperfectly expanded supersonic jets. The phenomenon is a result of a resonant feedback condition involving downstream traveling shear–layer disturbances and upstream traveling acoustic waves.
GS elastic waves
. sound waves
. . noise (sound)
. . . flow noise
. . . . aerodynamic noise
. . . . . **screech tones**
frequencies
. acoustic frequencies
. . **screech tones**
RT aeroacoustics
feedback
jet aircraft noise
jet mixing flow
nozzle flow
shear layers
supersonic jet flow
supersonic nozzles

seaborgium
(added May 1998)
GS chemical elements
. **seaborgium**
RT bohrium
dubnium

Sea–viewing Wide Field–of–view Sensor
(added December 1998)
UF *SeaWiFS*
GS scanners
. ocean color scanner
. . **Sea–viewing Wide Field–of–view Sensor**
RT chlorophylls
Coastal Zone Color Scanner
ocean surface
phytoplankton
remote sensors
satellite–borne instruments
water color

SeaWiFS
USE **Sea–viewing Wide Field–of–view Sensor**

Service Module (ISS)
(added March 1999)
DEF Primary Russian component of the International Space Station providing an early station living quarters and life support system functions to all early elements. Also provides propulsive attitude control and reboost capability for the early station.
UF *Zvezda Service Module*
GS modules
. space station modules
. . **Service Module (ISS)**
RT International Space Station
life support systems

SGR (astronomy)
USE **soft gamma repeaters**

Shergotty Nakhla Chassigny meteorites
USE **SNC meteorites**

Shuttle Superlightweight Tank
USE **external tanks**
propellant tanks

signal–processing–in–the–element detectors
USE **infrared detectors**

slenderness ratio
USE **aspect ratio**

SLWT (propellant tank)
USE **external tanks**
propellant tanks

smart materials
(added March 1998)
DEF Engineered materials capable of responding to their environment to a significant degree, by virtue of intrinsic properties and/or built–in sensor/actuator elements. Applications of these materials include vibration suppression/isolation, precision positioning, damage detection, and tunable devices.
UF *intelligent materials*
RT actuators
composite materials
electrorheological fluids
electrostriction
ferroelastic materials
ferroelasticity
ferroelectric materials
ferromagnetic materials
∞ materials
piezoelectric ceramics
∞ sensors
shape memory alloys
smart structures
vibration damping

SNC meteorites
(added March 1998)
DEF Meteorites with petrologic characteristics, isotopic signatures, trapped gas compositions, and relatively young crystallization ages (less than 1.3 billion years), which together point to a Martian origin. The name of these meteorites is derived from first three known examples—Shergotty, Nakhla, and Chassigny.
UF *Martian meteorites*
Shergotty Nakhla Chassigny meteorites
GS celestial bodies
. meteorites
. . stony meteorites
. . . achondrites
. . . . **SNC meteorites**
RT chassignites
Mars (planet)
Mars surface
nakhlites
shergottites

soft gamma repeaters
(added January 2000)
DEF A class of x–ray source which emits repeating bright bursts of "soft" or low–energy gamma rays, along with steady x–ray pulsations. By the end of 1999 only a handful of these sources had been identified, in our galaxy and in the Large Magellanic Cloud. They are associated with supernova remnants and are thus apparently some kind of young neutron star. One theory holds that these stars are young magnetars (magnetically–powered neutron stars). Bright bursts occur when the evolving, ultra–strong magnetic field stresses the neutron star's solid crust to breaking, in a sudden starquake. x–ray pulsations are due to the rotation of the star, with it's hot surface bright in x–rays.
UF *SGR (astronomy)*
GS celestial bodies
. stars
. . neutron stars
. . . **soft gamma repeaters**
. . x ray stars
. . . **soft gamma repeaters**
gamma ray sources (astronomy)
. **soft gamma repeaters**
x ray sources
. x ray stars
. . **soft gamma repeaters**
RT gamma ray astronomy
gamma ray bursts
magnetars
supernova remnants

sonochemistry
USE **ultrasonic processing**

space station modules
(added November 1998)
GS modules
. **space station modules**
. . Kvant modules
. . Priroda module
. . Service Module (ISS)
. . Unity connecting module
. . Zarya control module
RT air locks
compartments
International Space Station
Mir space station
orbital assembly
space erectable structures
space station structures
spacecraft modules

space tourism
(added April 1999)
GS space industrialization
. **space tourism**
tourism
. **space tourism**
RT space commercialization
space transportation

space weather
(added June 1999)
SN (FOR METEOROLOGICAL CONDITIONS RELATED TO THE MIDDLE AND LOWER ATMOSPHERES OF NON–EARTH PLANETS USE "PLANETARY METEOROLOGY".)
DEF The dynamic, highly variable conditions of the geospace environment that encompasses the sun, the interplanetary medium, and the Earth magnetosphere – ionosphere – thermosphere system. Major contributing factors include variations

in the solar wind, solar flares, and solar mass ejections. Effects of space weather phenomena include performance degradation of communication, navigation, and power systems on both spacecraft and ground–based systems; and potential health hazards during extravehicular activity.
RT Advanced Composition Explorer
aerospace environments
aerospace safety
Earth ionosphere
Earth magnetosphere
Earth orbital environments
geomagnetism
ionospheric disturbances
magnetic disturbances
magnetic storms
radiation hazards
solar activity effects
solar terrestrial interactions
space plasmas
weather

spiral bevel gears
(added May 1999)
GS gears
. bevel gears
. . **spiral bevel gears**

SPRITE detectors
USE **infrared detectors**

sprites (atmospheric physics)
(added January 2000)
DEF Short–lived luminosities observed at high altitudes above thunderstorms, apparently associated with upward discharges of thunderstorm electricity. They appear as columnar diffuse reddish glows between 30 km and 80 km above ground, lasting tens of milliseconds, following large positive cloud–to–ground lightning strokes.
UF *red sprites*
GS atmospheric radiation
. sky radiation
. . **sprites (atmospheric physics)**
electromagnetic radiation
. light (visible radiation)
. . sky radiation
. . . **sprites (atmospheric physics)**
RT atmospheric electricity
atmospheric ionization
cloud–to–ground discharges
elves
lightning
thunderstorms

Stardust Mission
(added March 1999)
DEF First U.S. mission launched to robotically obtain samples in deep space and return them to Earth. The NASA Discovery–class mission will return dust samples collected from the debris cloud surrounding the nucleus of Comet Wild 2. Interstellar dust will also be collected. The mission spacecraft takes advantage of an Earth gravity–assist maneuver to reach the comet, and uses an aerogel–based dust collector.
GS space missions
. flyby missions
. . **Stardust Mission**
RT comet nuclei
interstellar matter
Wild 2 comet

stepped leaders
(added August 1999)
GS electric current
. electric discharges
. . lightning
. . . leaders (meteorology)
. . . . **stepped leaders**

superhumps (astronomy)
(added October 1998)
RT accretion disks
astronomical photometry
binary stars
cataclysmic variables
dwarf novae
eclipsing binary stars
stellar spectrophotometry

Terra spacecraft
(added June 1999)
DEF First in a series of EOS (Earth Observing System) spacecraft developed to advance the understanding of the ways that the Earth's lands, oceans, air, ice, and life function as a total environmental system. The spacecraft carries five high–resolution instruments: the Advanced Spaceborne Thermal Emission Radiometer (ASTER), the Clouds and the Earth Radiant Energy System (CERES), the Multi–Angle Imaging Spectroradiometer (MISR), the Moderate Resolution Imaging Spectroradiometer (MODIS), and the Measurements of Pollution in the Troposphere (MOPITT) instrument.
UF *AM–1 (EOS) spacecraft*
EOS AM–1 spacecraft
GS artificial satellites
. **Terra spacecraft**
Earth Observing System (EOS)
. **Terra spacecraft**
RT Earth observations (from space)
remote sensing

thermal lenses
USE **thermal lensing**

thermal lensing
(added November 1998)
UF *thermal lenses*
GS **thermal lensing**
. thermal blooming
RT atmospheric optics
focusing
laser beams
photothermal deflection spectroscopy
wave front deformation

thermoacoustic effects
(added May 2000)
DEF Phenomena associated with the combination of temperature, pressure and displacement oscillations caused by acoustic waves interacting with solid boundaries, such as the walls of a tube or a "stack".
RT acoustic excitation
acoustic instability
acoustics
acousto–optics
combustion stability
∞ effects
heat transfer
sound waves
thermoacoustic refrigerators
thermophysical properties

thermoacoustic refrigerators
(added May 2000)
DEF Cooling devices in which intense sound waves in pressurized resonant cavities are used to generate temperature gradients in an array of parallel plates in the interior of a tube that serves as a heat exchanger and in which heat is drawn away by a heat sink.
GS refrigerating machinery
. refrigerators
. . **thermoacoustic refrigerators**
RT cooling systems
refrigerating
thermoacoustic effects

thermocapillary migration
(added September 1999)
DEF Phenomenon where droplets (or bubbles) in a host fluid with a uniform temperature gradient migrate to the hot end of the host fluid because of the temperature dependence of the interfacial energy of the droplets.
RT bubbles
capillary flow
drops (liquids)
electromigration
interfacial tension
Marangoni convection
microgravity
space processing
temperature gradients
thermomigration

time domain analysis
(added April 1999)
GS analysis (mathematics)
. **time domain analysis**
. . finite difference time domain method
RT control systems design
dynamic response
parameter identification
signal processing
∞ time response

time synchronization
(added December 1998)
GS synchronism
. **time synchronization**
RT clocks
frequency standards
frequency synchronization
Global Positioning System
time measurement
time signals
universal time

Titan 4B launch vehicle
(added October 1998)
GS launch vehicles
. Titan launch vehicles
. . Titan 4 launch vehicle
. . . **Titan 4B launch vehicle**
rocket vehicles
. multistage rocket vehicles
. . Titan launch vehicles
. . . Titan 4 launch vehicle
. . . . **Titan 4B launch vehicle**
RT Cassini mission
laser gyroscopes

total impulse
(added March 2000)
DEF The integral of thrust over a given interval of time; the product of thrust and duration expressed in force–seconds; the total thrust produced by a rocket engine or motor over the entire time that its fuel is burning.
GS impulses
. **total impulse**
RT propulsion system performance
propulsive efficiency
spacecraft propulsion
specific impulse

thrust

tourism
(added April 1999)
GS **tourism**
. space tourism
RT industries
recreation
transportation
∞ travel

TRACE satellite
USE **Transition Region and Coronal Explorer**

transition elements (chemistry)
USE **transition metals**

Transition Region and Coronal Explorer
(added May 1998)
DEF Small Explorer Mission satellite supporting the investigation of the relationships between fine–scale magnetic fields and their associated plasma structures in the transition region and lower corona of the Sun.
UF *TRACE satellite*
GS artificial satellites
. scientific satellites
. . Explorer satellites
. . . **Transition Region and Coronal Explorer**
RT chromosphere
SOHO Mission
solar atmosphere
solar corona
solar magnetic field
solar observatories
solar physics
solar transition region

transplutonic planets
USE **hypothetical planets**

transverse momentum
(added June 1999)
GS momentum
. **transverse momentum**
RT angular momentum
elementary particle interactions
particle motion
transverse acceleration

Trefftz method
(added July 1998)
DEF Boundary–type approximation scheme for the solution of boundary value problems for partial differential equations.
UF *hybrid–Trefftz finite element method*
GS analysis (mathematics)
. numerical analysis
. . approximation
. . . boundary element method
. . . . **Trefftz method**
RT bending theory
boundary conditions
boundary value problems
finite element method
partial differential equations
plate theory
structural analysis

TRMM satellite
(added May 1998)
DEF Satellite supporting the joint US–Japanese Tropical Rainfall Measuring Mission (TRMM) to explore tropical rainfall and its effects on the Earth energy budget, general circulation, and climate. The TRMM satellite represents the first dual deployment of a precipitation radar and passive microwave radiometer on an Earth–viewing satellite.
UF *Tropical Rainfall Measuring Mission sat*
GS artificial satellites
. meteorological satellites
. . **TRMM satellite**
. scientific satellites
. . **TRMM satellite**
RT atmospheric circulation
Earth radiation budget
equatorial atmosphere
rain
tropical meteorology

Tropical Rainfall Measuring Mission sat
USE **TRMM satellite**

Ukrainian space program
(added January 1999)
GS programs
. space programs
. . **Ukrainian space program**
RT Ukraine
Zenit launch vehicles

ultrasonic processing
(added June 1998)
DEF The use of ultrasonic radiation to synthesize a compound or material, or alter the structure, properties, or form of a material.
UF *sonochemistry*
ultrasonic treatment
RT ∞ processing
ultrasonic cleaning
ultrasonics

ultrasonic treatment
USE **ultrasonic processing**

uncertain systems
(added June 2000)
RT control systems design
control theory
fuzzy systems
linear systems
nonlinear systems
probability theory
∞ systems

undercooling
USE **supercooling**

Unity connecting module
(added November 1998)
DEF Component of the International Space Station providing six ports that serve as connecting points for other station modules and framework elements.
GS modules
. space station modules
. . **Unity connecting module**
RT Integrated Truss Structure Z1
International Space Station
spacecraft docking

VentureStar launch vehicle
(added June 1999)
DEF Reusable single–stage–to–orbit launch vehicle employing linear aerospike engines, and having a payload capacity roughly equivalent to that of the Space Shuttle; developed in coordination with the X–33 advanced technology demonstrator vehicle.
GS aerospace vehicles
. aerospace planes
. . **VentureStar launch vehicle**
maneuverable spacecraft
. aerospace planes
. . **VentureStar launch vehicle**
reentry vehicles
. recoverable spacecraft
. . reusable spacecraft
. . . aerospace planes
. . . . **VentureStar launch vehicle**
soft landing spacecraft
. aerospace planes
. . **VentureStar launch vehicle**
RT aerospike engines
commercial spacecraft
X–33 reusable launch vehicle

very large transport aircraft
(added November 1998)
DEF Aircraft capable of a maximum takeoff weight greater than 400 metric tons (881,600 lbs) or having a seating capacity greater than 660.
UF *VLTA (aircraft)*
GS transport aircraft
. **very large transport aircraft**
RT cargo aircraft
passenger aircraft

VLTA (aircraft)
USE **very large transport aircraft**

VOC (organic chemistry)
USE **volatile organic compounds**

volatile organic compounds
(added March 2000)
DEF Any compounds of carbon (excluding carbon oxides, carbonic acid, metallic carbonates and carbides, and carbon–nitrogen compounds) that are readily vaporizable; any of such compounds that participate in atmospheric photochemical reactions, or that are considered indoor, local, regional, or global contaminants.
UF *VOC (organic chemistry)*
GS organic compounds
. **volatile organic compounds**
RT air pollution
air quality
contaminants
exhaust emission
indoor air pollution
ozone
photochemical reactions

water sampling
(added March 1998)
DEF The process of obtaining a representative sample of water from any natural or artificial environment.
GS sampling
. **water sampling**
RT environmental monitoring
ground water
pollution monitoring
sea water
surface water
water
water pollution
water quality

wave rotors
(added March 1998)
DEF Rotor devices that use gasdynamic waves to transfer energy rather than the motion of solid surfaces. Typically, they consist of a series of passages arranged on a drum which rotates about an axis. Through rotation, the ends of the passages are periodically exposed to various circumferentially arranged ports which initiate the traveling expansion or compression waves within the passages. The particular circumferential

location of the ports determines the thermodynamic cycle of the working fluid.
GS rotating bodies
. rotors
. . **wave rotors**
RT compression waves
energy transfer
engine parts
gas dynamics
gas generators
gas turbine engines
topping cycle engines
turbomachinery
turboshafts
wave generation

weakly interacting massive particles
(added November 1999)
DEF Hypothetical elementary particles predicted by supersymmetry theories, that interact only through gravity and weak–type interactions; postulated to account for dark matter in the Universe.
UF *cosmions*
WIMPs (astronomy)
GS particles
. elementary particles
. . hypothetical particles
. . . **weakly interacting massive particles**
RT dark matter
missing mass (astrophysics)
solar neutrinos

WIG vehicles
USE **wing–in–ground effect vehicles**

Wild 2 comet
(added March 1999)
DEF Periodic comet, discovered January 1978, relatively new to the inner Solar System due to a shift in its orbit caused by the gravitational influence of Jupiter.
GS celestial bodies
. comets
. . **Wild 2 comet**
RT Stardust Mission

WIMPs (astronomy)
USE **weakly interacting massive particles**

wing–body and tail configurations
USE **body–wing and tail configurations**

wing–body configurations
USE **body–wing configurations**

wing–in–ground effect vehicles
(added December 1999)
DEF Vehicles designed to fly about half their mean chord above the surface, taking advantage of the reduced drag and increased lift caused by ground effect. These vehicles, also known as WIGs or WIGEs, normally operate above a water surface.
UF *ekranoplanes*
WIG vehicles
GS ground effect machines
. **wing–in–ground effect vehicles**
RT ground effect (aerodynamics)
surface effect ships

X–32 aircraft
(added October 1998)
DEF Experimental supersonic strike fighter developed to be configured as a conventional or short takeoff/vertical landing vehicle. Developed as part of the Joint Strike Fighter (JSF) program.
GS Boeing aircraft
. **X–32 aircraft**
jet aircraft
. **X–32 aircraft**
research vehicles
. research aircraft
. . **X–32 aircraft**
supersonic aircraft
. **X–32 aircraft**
V/STOL aircraft
. **X–32 aircraft**

X–35 aircraft
(added October 1998)
DEF Experimental strike fighter incorporating a vertical lift fan for short takeoff/vertical landing capability. Developed as part of the Joint Strike Fighter (JSF) program.
GS jet aircraft
. **X–35 aircraft**
Lockheed aircraft
. **X–35 aircraft**
research vehicles
. research aircraft
. . **X–35 aircraft**
V/STOL aircraft
. **X–35 aircraft**

X–37 vehicle
(added March 2000)
DEF NASA/Boeing experimental space plane developed to demonstrate airframe, propulsion, and operations technologies for reduced–cost reusable launch vehicles. The unpiloted X–37 can be carried into orbit by the Space Shuttle or launched by an expendable rocket, and flies in both orbital and reentry environments, operating at speeds up to 25 times the speed of sound.
GS aerospace vehicles
. aerospace planes
. . **X–37 vehicle**
hypersonic vehicles
. **X–37 vehicle**
maneuverable spacecraft
. aerospace planes
. . **X–37 vehicle**
reentry vehicles
. recoverable spacecraft
. . reusable spacecraft
. . . aerospace planes
. . . . **X–37 vehicle**
research vehicles
. **X–37 vehicle**
soft landing spacecraft
. aerospace planes
. . **X–37 vehicle**
RT reusable launch vehicles
∞ spacecraft

X–43 vehicle
(added September 1999)
DEF The experimental research vehicle of the NASA Hyper–X program designed to flight validate key propulsion and related technologies for air–breathing hypersonic aircraft.
GS aerospace vehicles
. **X–43 vehicle**
hypersonic vehicles
. **X–43 vehicle**
research vehicles
. **X–43 vehicle**
RT hypersonic flight
Pegasus air–launched booster
supersonic combustion ramjet engines

Zarya control module
(added November 1998)
DEF Component of the International Space Station providing propulsion, steering, and communications during the early assembly stages of the station; later serving as a docking port and fuel tank. Zarya was built by Russia under contract to the U.S. and is owned by the U.S.
GS modules
. space station modules
. . **Zarya control module**
RT International Space Station

Zenit launch vehicles
(added January 1999)
GS launch vehicles
. **Zenit launch vehicles**
RT sea launching
Ukrainian space program

zero sum games
(added October 1998)
GS games
. **zero sum games**
RT differential games
Markov processes
optimal control
pursuit–evasion games
saddle points (game theory)

Zvezda Service Module
USE **Service Module (ISS)**

NASA THESAURUS SUPPLEMENT

PART 2
ROTATED TERM DISPLAY

NUMERALS

AM- **1** (EOS) spacecraft
use Terra spacecraft
Deep Space **1** Mission
EOS AM- **1** spacecraft
use Terra spacecraft
Wild **2** comet
H- **2** control
Delta **3** launch vehicle
Delta **4** launch vehicle
Titan **4B** launch vehicle
GOES **10**
X- **32** aircraft
X- **35** aircraft
X- **37** vehicle
X- **43** vehicle
Mars Surveyor **98** Lander
use Mars Polar Lander
Mars Surveyor **98** Orbiter
use Mars Climate Orbiter
Mars Surveyor **98** Program
Boeing **717** aircraft
Mars Surveyor **2001** Mission

A

carrier sense multiple **access**
ACE satellite
use Advanced Composition Explorer
content- **addressable** memory
use associative memory
Advanced Composition Explorer
Darkstar unmanned **aerial** vehicle
use pilotless aircraft
reconnaissance aircraft
aeroshells
machine **aided** indexing
use indexing (information science)
Boeing 717 **aircraft**
very large transport **aircraft**
VLTA **(aircraft)**
use very large transport aircraft
X-32 **aircraft**
X-35 **aircraft**
greedy **algorithms**
Alpha Magnetic Spectrometer
AM–1 (EOS) spacecraft
use Terra spacecraft
EOS **AM–1** spacecraft
use Terra spacecraft
AMS (spectrometer)
use Alpha Magnetic Spectrometer
cost benefit **analysis**
use cost analysis
cost effectiveness
frequency domain **analysis**
information **analysis**
time domain **analysis**
anisoplanatism
antenna gain
antiphase boundaries
antiphase domains
use antiphase boundaries
proton- **antiproton** interactions
APB (materials)
use antiphase boundaries
archaeomagnetism
use paleomagnetism
field-programmable gate **arrays**
associative memory
associative storage
use associative memory
MACHOs **(astronomy)**
use massive compact halo objects
SGR **(astronomy)**
use soft gamma repeaters
superhumps **(astronomy)**
WIMPs **(astronomy)**
use weakly interacting massive particles
Chandra X Ray **Astrophysics** Facility
use X Ray Astrophysics Facility
sprites **(atmospheric** physics)
embedded **atom** method
modified embedded **atom** method
use embedded atom method
automatic indexing
use indexing (information science)

B

Planet- **B** spacecraft
use Nozomi Mars Orbiter
kink **bands**
rocket- **based** combined-cycle engines
lithium **batteries**
Euler-Bernoulli **beam** theory
use Euler-Bernoulli beams
Euler-Bernoulli **beams**
cost **benefit** analysis
use cost analysis
cost effectiveness
Euler- **Bernoulli** beam theory
use Euler-Bernoulli beams
Euler- **Bernoulli** beams
bevel gears
spiral **bevel** gears
biomass burning
Biot–Savart law
wing- **body** and tail configurations
use body-wing and tail configurations
wing- **body** configurations
use body-wing configurations
Boeing 717 aircraft
bohrium
Bond number
Hale- **Bopp** comet
antiphase **boundaries**
biomass **burning**

C

D

E

F

G

H

I

Population **III** stars
total **impulse**
automatic **indexing**
use indexing (information science)
document **indexing**
use indexing (information science)
machine aided **indexing**
use indexing (information science)
indexing (information science)
inflight simulation
use in-flight simulation
information analysis
indexing **(information** science)
FSOI **(integrated** optics)
use free-space optical interconnects
Integrated Truss Structure Z1
intelligent materials
use smart materials
weakly **interacting** massive particles
proton-antiproton **interactions**
intercalibration
free-space optical **interconnects**
optical **interconnects**
cochannel **interference**
intracloud discharges
ion optics
Iridium network
Iridium satellites
use communication satellites
Iridium network
Service Module **(ISS)**
ISS (space station)
use International Space Station

J

Java (programming language)
scarf **joints**
Josephson effect
Josephson tunneling
use Josephson effect

K

kink bands
kinking
knowledge discovery
use data mining
knowledge extraction
use data mining

L

Mars Polar **Lander**
Mars Surveyor 98 **Lander**
use Mars Polar Lander
Java (programming **language)**
markup **languages**
use document markup languages
very **large** transport aircraft
Delta 3 **launch** vehicle
Delta 4 **launch** vehicle
Titan 4B **launch** vehicle
VentureStar **launch** vehicle
Long March **launch** vehicles
Zenit **launch** vehicles
Laves phases
Biot-Savart **law**
perfectly matched **layers**
stepped **leaders**
leaders (meteorology)
thermal **lenses**
use thermal lensing
thermal **lensing**
lithium batteries
Long March launch vehicles
hardware-in-the- **loop** simulation
hardware-in-the- **loop** tests
dielectric **loss**
Lunar Prospector

M

machine aided indexing
use indexing (information science)
MACHOs (astronomy)
use massive compact halo objects
magnetars
magnetic nozzles
Alpha **Magnetic** Spectrometer
magnetostratigraphy
e- **mail**
use electronic mail
preventive **maintenance**
cellular **manufacturing**
use group technology (manufacturing)
group technology **(manufacturing)**
Long **March** launch vehicles
markup languages
use document markup languages
Mars Climate Orbiter
Mars Global Surveyor
Mars missions
Nozomi **Mars** Orbiter
Mars Polar Lander
Mars Surveyor 98 Lander
use Mars Polar Lander
Mars Surveyor 98 Orbiter
use Mars Climate Orbiter
Mars Surveyor 98 Program
Mars Surveyor 2001 Mission
Martian meteorites
use SNC meteorites
massive compact halo objects
weakly interacting **massive** particles
perfectly **matched** layers
APB **(materials)**
use antiphase boundaries
ferroelastic **materials**
intelligent **materials**
use smart materials
smart **materials**
FDTD **(mathematics)**
use finite difference time domain method
MEAM (physical chemistry)
use embedded atom method
Tropical Rainfall **Measuring** Mission sat
use TRMM satellite
meitnerium
associative **memory**

N

O

P

Q

R

S

T

U

V

W

X

Z

NASA THESAURUS SUPPLEMENT

PART 3
CHANGES

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The *NASA Thesaurus Supplement* is a cumulative update to the 1998 edition of the *NASA Thesaurus* (NASA/SP–1998–7501). The Supplement, published every 6 months, includes all new terms and associated hierarchies added since the cutoff for the 1998 edition (December 1997). Parts 1 and 2 (*Hierarchical Listing* and *Rotated Term Display*) correspond to Volumes 1 and 2 of the 1998 printed edition of the *NASA Thesaurus*. Definitions are included in Part 1; uppercase/lowercase forms are provided in both Parts 1 and 2. Part 3 is a list of deletions or changes to valid terms.

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